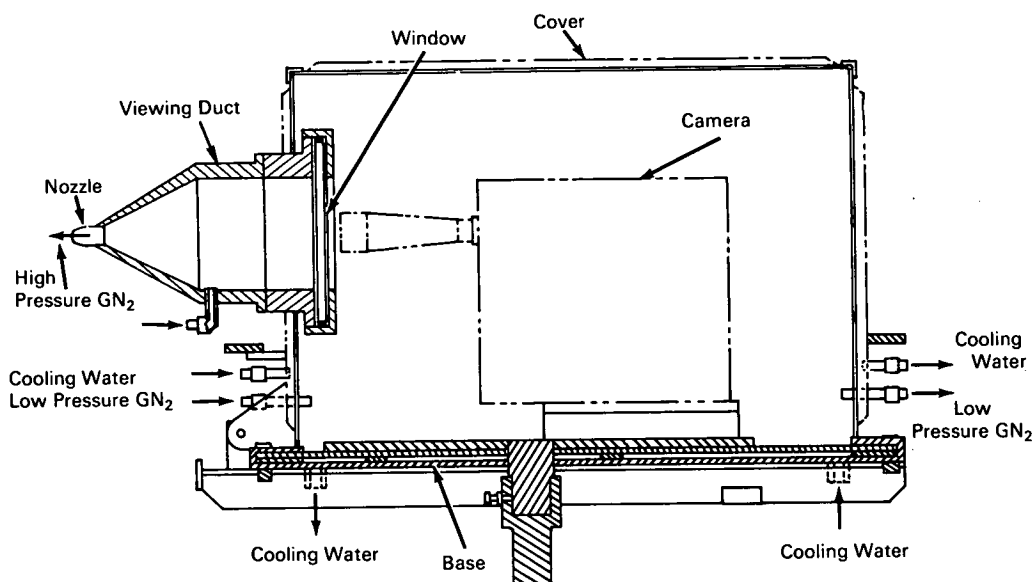


# NASA TECH BRIEF



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## Rocket Engine Nozzle Photographic System



A protective enclosure for a camera, located on the centerline of the exhaust stream of a rocket engine, permits continuous recording of the erosion processes of various materials used in nozzle throat structures. The system uses a standard, commercially available camera in a water-cooled, pressurized enclosure having a unique, inert gas-swept viewing duct.

A base and hollow shell cover structure are both cooled by a constant flow water supply. The cover is of shell and tube design and encloses the camera, whose lens centerline registers with the centerline of a viewing duct mounted in one end of the cover structure. The viewing duct has a cylindrical section that mounts a protective transparent window in front of the camera lens, and a frustum-like section that terminates away from the camera lens in an open nozzle located directly along the camera centerline.

High pressure gaseous nitrogen enters the viewing duct and exits through the nozzle to deflect the engine exhaust stream thus preventing impingement of hot gases and particles that would otherwise soil or damage the transparent window in front of the camera lens. Gaseous nitrogen at low pressure enters one end of the enclosure formed by the cover structure and exits out the other, thus maintaining a gradient-free thermal environment for the camera.

### Notes:

1. Water pressure of 125 psi for the base and cover structure shell, and gaseous nitrogen pressure of 25 psi for the enclosure have been found adequate.
2. This innovation has been successfully used to photograph structural erosion occurring with the lately developed sterilized aluminum-bearing solid propellants.

(continued overleaf)

3. Inquiries concerning this invention may be directed to:

Technology Utilization Officer  
NASA Pasadena Office  
4800 Oak Grove Drive  
Pasadena, California 91103  
Reference: B68-10113

**Patent status:**

This invention is owned by NASA, and a patent application has been filed. Royalty-free, nonexclusive licenses for its commercial use will be granted by NASA. Inquiries concerning license rights should be made to NASA, Code GP, Washington, D.C. 20546.

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